High School Curriculum of Water Conservation

A Senior Project

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of the Requirements for the Degree

Agriculture Science; Bachelor of Science

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Abstract

The purpose of this project was to create a less plan for high school students to help them understand the importance of water conservation. Through this understanding hopefully generate some ideas to solving the water crisis. The issue of water allocation and usage has been a long standing issue that California has been facing. This lesson plan will give the students a gateway to a topic that is only briefly talked about in the majority of the curriculums.

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Chapter One

Introduction

Education is one of most highly valued concepts in United States, this is because many people believe that education can lead to many opportunities that otherwise would be hard to come by. One of the biggest steps is high school, not only because of the curriculum that the students learn from but also this is the time when the students start to find out which subjects they have talent in. High school is one of the critical steps in getting an education. High school education is one of the most important stages where growing teens learn material that will shape their thinking process. Through this critical stage one of the people who has enormous influence are the teachers. The teachers usually teach from a curriculum that is already planned out by the state or the board of education. This curriculum is a critical tool that teachers rely on to teach their students. Although there are many subjects that a teen needs to learn I will be talk about agriculture and its water conservation.

Water is one of the most valuable resources that Earth has, and it must be used responsibly or like any other natural resource it will be depleted and gone forever. Although Earth has a massive quantity of water, most of the water that is available to us is unsuitable for urban or agriculture use. According to the United Nations(UN) the estimated population growth by year 2300 is 36.44billion people (United Nation, 2004, pg. 13). This

means that as a planet we will need around six times more water that we use now. The only way to support this huge population growth and demand is conservation, storage, and a consistent supply.

Conservation is not an impossible task, if everyone contributes then our precious water resource could be preserved for many years to come. Of course as technology develops there will be a great increase in water usage efficiency and recycling waste water into usable water. During the past couple of decades there have been significant amount of technology increase in agriculture that helps farmers to use water in the most effective manner. Since agriculture needs and uses a lot of water there has been a huge push to use recycled water for irrigation.

Using recycled water is one of the ways that agriculture is participating to conserve water in their industry. Many people do not know that even though agriculture uses a big portion of the water that much of this water is recycled or treated water. This means that this water cannot be used for urban purposes. However, many people are blinded by the numbers that show agriculture using about half of our water for irrigation purposes. Agriculture is the industry that grows the foods that we eat, so we need to provide this industry with all the resources that it needs to thrive.

When looking at the science requirements for California education K-12 there are no requirements for a high school to have agriculture education. However, agriculture is one of the biggest industries in California. After the

technology boom in the Silicon Valley agriculture is the biggest industry in California and as a state we produce a chunk of the nation's food supply. Due to our moderate climates and fertile soil California has one of the biggest agriculture industry in the country. This means without adequate water the nation's food supply will greatly decrease.

California as a state has been making laws and regulations that try to protect our water resource. There have been proposition 84 which says that California will be spending lots of money on water projects that will hopefully secure the water resource. These legislatures will help a little bit but there is only one way for us to make sure that our water source will be safe for the future. The sure plan is to conserve water today so that we may be able to use the water tomorrow.

Statement of the Problem

The California education system does not have a curriculum that teaches high school students about water usage in agriculture and what the industry is doing to protect a valuable resource. Therefore, it is critical to have this curriculum that needs to be implemented into all of the California high schools.

The Importance of the Project

Year after year there are statistics that point to global warming which results in less and less rain for California. This means that agriculture will be portioned smaller amounts of water from California's total usable water. The global warming does not destroy water, but rather the climate changes will transfer the usable water into a form of water that we cannot use like seawater. With smaller amounts of snow and rain our rivers will dry up causing agriculture to use less water. However agriculture is an industry that relies on water.

Without water agriculture cannot exist. For agriculture water cannot be replace with anything else, and without agriculture there will be no food. With no food we cannot live the lifestyle that we do now. Everyone will need to conserve water so that agriculture may be able to continue to grow foods for us and later generations.

Purpose(s) of the Project

The purpose of the project tells the reader your purpose(s) in completing the study. In other words, why are you doing this particular project (besides meeting graduation requirements)? The purpose should indicate, in general terms, the final product or outcome.

Objectives of the Project

- To research and understand how to make a curriculum for a high school agriculture science class.
- To teach students about scarcity of water.
- To raise awareness about agriculture and water issues the industry is facing and will be facing in the near future.
- To develop a curriculum that could be used in a high school classroom.

Definition of Important Terms

- Curriculum: a course of study in a particular subject.
- Conservation: preservation or restoration from complete loss or neglect.
- High School: secondary education usually grades nine through twelve.
- Water Crisis: scarcity of water for the demand.

Summary

Making a high school curriculum about water conservation in agriculture and other parts of society will benefit everyone. This curriculum will be based on what the agriculture is doing to help conserve water and what it is planning to do. Also this curriculum will give suggestions for other industries like urban, on how to save water in our homes. Even though there is not a set curriculum for water conservation in the agriculture industry as

of now, as population grows and the demand for water goes up exponentially there is an urgent development in a need for education in water conservation.

Chapter Two

Review of Literature

A California high school curriculum which teaches students about the water conservation part of agriculture is important, because this lesson plan will allow the students to understand the importance of water. It also helps raise awareness of the growing water crisis in California and what steps the agriculture industry is taking to help.

Requirements of a High School Curriculum

When planning any type of curriculum for a high school level, there are many parameters and conditions which need to be met before the curriculum can be passed as an eligible lesson plan. In preparing for the curriculum a Student must know the importance the origins of California's fresh water and the relation between supply and need (Science Framework, 1989, pg. 277). This is just one example of a parameter in order to make a high school curriculum. Because there are no specific requirements intended for high school students for water conservation in agriculture the curriculum had to be derived from the basic science boundaries.

The science boundaries for California's curriculum states every student has to have a basic knowledge in Physics, Chemistry, Biology/Life Sciences, Earth Sciences and Investigation and Experimentation (Science Content, 1998). In these sections there are various numbers of conditions that must

be filled before the lesson plan can be acknowledged as a California high school certified. For agriculture the conditions must be used below the Biology/Life Sciences. For water conservations specifically the conditions are found in the Earth Sciences. In order for the lesson plan to be adopted by the California's board of education this lesson plan must meet the requirements from both Biology/Life Sciences and Earth Sciences.

California Water Crisis

As for filling out the conditions for a lesson plan that will be certified by the California's board of education the students need to be taught about the growing water shortage. There are many aspects of California's economy that thirsts for water which include: Urban, Agriculture, Environmental and Natural. These areas can be differentiated by how and the reason they use the water for. Figure 1 shows the water usage for California.

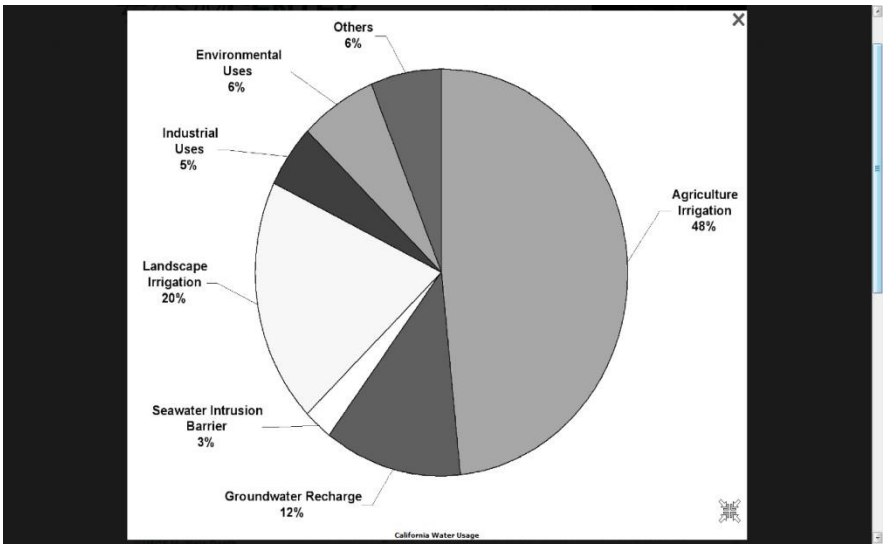


Figure 1 Uses of Clean Water in California California Water Usage

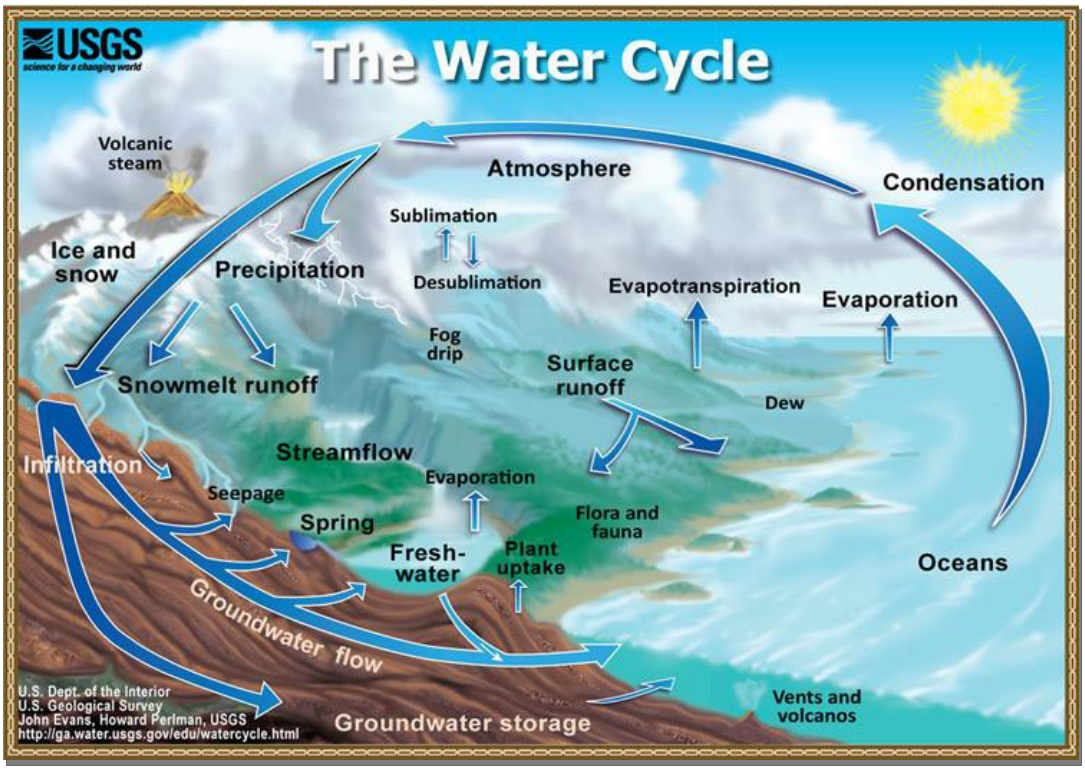


Figure 2 Flowchart of the Water Cycle

Agriculture uses a big part of California's water because they need the water to grow crops that will not only feed California but United States and even a portion of the world. There have been many efforts to avert water from agriculture to urban and other areas that are facing water shortages (Water Watchers, 1987). Although there are not very many recent studies that are done for water consumption of California's agriculture industry it is assumed that agriculture is still the highest consumer of water.

Students need to learn that although agriculture is the biggest consumer of water little or no water should be averted from this section of the economy. Agriculture is where we grow our food which we need to survive. Agriculture is doing the best it can to develop and use technology

that conserve water (Sustainable Agriculture, 2006). However, the urban side of water consumption has been slacking on their part to save California from this water crisis.

Month	Severe Drought (m/year) (%)	Moderate Drought (m/year) (%)	Slight Drought (m/year) (%)
Oct	65	68	88
Nov	73	73	99
Dec	93	86	118
Jan	32	46	65
Feb	15	19	23
Mar	18	25	30
Apr	65	75	89
May	49	70	81
Jun	61	76	90
Jul	63	81	94
Aug	59	74	86
Sep	50	67	79
Annual	49	61	74

Table 1 Months per Percentage in Drought Conditions Total Water Use in the United States, 2005.

Conservation might be a part of the big picture solution, but it alone will not be enough to combat the drought. Surface water reallocation is another proposed solution that is being looked at. This reallocation of the surface water will help many of the areas that are in dire need. As you can see in Table 1, there is a upward trend of drought condition in annual records.

Resources Needed

There are many things that need to be done before this curriculum can be incorporated into the high school system. One of the most important

parts that step is to make sure that all of the high schools have the necessary equipment and information to pass on to the students. This critical information must be researched and provided by the government so that students will have more awareness in the water crisis.

Textbooks are one of the biggest assets to a classroom setting, and must be chosen with care. There were many textbooks that are well suited for this cause to inform the students about the growing water crisis in the agriculture industry of California but two stood out from them all. *Water Conservation: Student Edition* by Leslie Crawford and *Food and Water: Threats, Shortages and Solutions* by Bernard S. Cayne. The combination of these two books will help deliver a holistic view on the crisis of water.

Chapter Three

Methods

The purpose of this project is to make a curriculum so that high school students can be exposed to the water crisis that is developing in California. An early exposure to the water crisis will not only bring about more interest and awareness to conserve water in California, but to make sure the future of the agriculture industry will have a plan against the rising water shortage.

Water Crisis Focus

There are many important aspects of California's water crisis but this project emphasizes two primary users: Agriculture and Urban. These two parts of our society make up the majority of the water use in California. This means that if we can raise awareness in these two elements then we can have a better understanding of our limited resource. Also by focusing on the urban and agriculture part of water use, it gives the students a way to bond with the subject matter they are learning. Urban or agriculture use is something that most or all student participates in. Although the majority of the curriculum will be focused on the urban and agriculture part of the water crisis, the other area will be mentioned throughout the lesson.

The majority of the curriculum is designed to focus on the agriculture and urban sections of the water crisis because as the population grows the demand for food and water in grow exponentially. When the demand climbs

there will not be any extra resources to help produce these high demands. The resources will actually become scarcer resulting in a conflict of proportioning the water.

Targeting the Audience

This curriculum will be geared towards introduction classes at a high school level in California. It would be very beneficial for the topic of California's water crisis to be incorporated into an introductory agriculture class because water is a key fundamental to the agriculture industry. This would not only inform of the students that are early in their education career which will give them time to think about our situation but also influence their decisions. This early incorporation of water conservation would allow teachers to incorporate the topic of water into any course that will build upon the introductory class.

Curriculum Development

Through a quick survey of the local high schools in 2012 there are no courses that focus on the water crisis however, the teachers are well aware of the growing water crisis and acknowledge that it is an important subject. The only way that a student might be able to learn extensively about the California water crisis is to pick the water crisis topic for one of the projects that is assigned by the teacher. Although educators can encourage students

to pick topic in the water field the students are not required to take any course or curriculum that has water as the main topic.

This project will start off with an introduction of the water crisis in California and how long it has been going on. This will not only include how much water is being used on an average basis but also how much water is being deposited into the natural water reservoirs. Then there will be a shift for the major types of industries or areas that taxes our water sources the most. Then will narrow down to the agriculture and urban side of the water uses and how much each area uses the allotted resource. Finally have some activities that show students how much water can be saved by doing simple things and how much water is being used in each of selected parts. These activities range from simple things as recycling water runoff to installing different equipment to make sure there is more precise watering for agriculture use and less waste on the urban side.

Activities

One of the activities that are included is a student research project. In this project the students will research current statistics of water usage in the agriculture and urban industries. Then they will research how much rainfall, snowpack melt, and recycled water is provides for the need. Finally they calculate how much extra the two aspects need. This will show that even just these two parts of California require more water than we have.

Secondly, speeches are to be incorporated. The topics for the speeches will be left to the students to decide, however, the topic must be in the boundaries of California's water. It would be interesting to see what type of resources the students can gather about California's water crisis.

Third, there is going to be a PowerPoint presentation that the teachers will present to the students as a lecture so that the students can have a set of notes that they can refer back to whenever they need during other activities. After the PowerPoint has been given as a lecture in class the file should be uploaded to a website so that the students can access the tables and graphs that are included in the presentation because those information will be critical during the research project or the speech activity.

Outline of Lesson Plan

The key part of this lesson plan is that should be addressed with the curriculum is the water use in California. Students will have a lesson plan that will start off with the basics of the water cycle. How, when, and what are the essential parts of the water cycle is. Another big part of this curriculum is to make sure the students know the water cycle determines most of our usable water originates from. This would fulfil another state standard in the ecology for grade nine to twelve section d. The usable water that is created and naturally filtered has a certain amount that the process can produce.

Since there are limited amounts of usable water that can be formed from the water cycle there will be fairly unfluctuating volume of clean water. However, with the rising population and demand for high yields per square mile the demand for water continues to rise at an astonishing rate. To meet these demands there needs to be some sort of solution to either increase the water supply or reduce the amount of water that is being used.

California, as one of the leading agriculture industries, withdraws the most ground water according to the 2005 United State Geological Survey (USGS) of ground water usage in the United States. According to the chart one California uses anywhere from 20,000 to 46,000 million gallons of water per day compared to Nevada's 2,000 to 5,000 million gallons of water per day, California is a huge guzzler of water.

Data Collection

The data that has been presented in this project so far has been collected through many different resources and venues. As many of you know the water crisis in California has been on a path of escalation for the past several years. As the media covers more of the water crisis I have tried to update my data as new information has started to leak out. One of the facts that stayed consistent throughout this project is the solutions that are talked about. Although there are new technology that is being proposed

rapidly many of California's leader still believe that conservation, storage and reallocation of surface water will be enough to survive the drought.

Many of the data that has been collected has been sifted through with a fine comb as to not confuse the reader of this project of what the real purpose of this project is. The introduction part of this project is to make sure to give a brief summary of the current water crisis but the majority of this project is to make sure the students get a curriculum of water conservation incorporated into their learning. This means that the data that are collected had to be geared towards the conservation. Although there were many information and data about other ideas that are proposed to be a solution for California's water crisis, the information that pertained to conservation was put into this project.

Data Analysis

Much of the data that were found were about storage and how storage can solve California's current water crisis. Storage may be one of the key solutions to the drought but storage is something that will only solve our current water issue. By implanting education of conservation to students that will be the new generation the potential for a long term solution rises. This project will propose a curriculum that the teachers can implement in their introductory agriculture science class. This subject will not only raise

awareness on California's Water Crisis but also allow the students to use their critical thinking skills to propose some possible solutions.

The activities that are attached at the end of this project are designed to make sure the students get a general grasp of the problem without going into huge complicated details. Some of the activities allows the students to engage their critical thinking skills and their exercise their writing abilities. The research project will allow the students to pick some area of the water conservation that they are interested in. When students are given the freedom to pick a topical matter they are interested in they tend to be more energized and motivated to complete the project.

Summary

The purpose of listing the methods was to inform the readers about the different decisions that were made throughout compiling this project. There were too many aspects of this topic to be included in a senior project, so this chapter explains how and why other areas were left out. This chapter clarifies arising questions of why certain aspects of California's Water Crisis were left out. For example, only the agriculture and urban industries have been selected for the main bulk of the curriculum. This is because these two parts of California uses the most water that California has to offer. Although the curriculum will state that there are other aspects of California that uses water these two areas are the biggest consumers.

Chapter Four

Results

Water may be the single most important topic to not only agriculture but also urban areas. This is because without water many daily operations would not be possible. This curriculum below is designed for students that are enrolled in introductory agriculture science classes. In the introductory class it will give the students a general idea of how the water crisis can and has affected the agriculture and urban sectors.

Water Conservation Lesson Plan

Step 1A: Enter Basic Information about the Lesson	
*Name of Lesson:	Water Conservation
*Lesson Grade Level:	9
Additional Grade Levels:	10,11
Co-Contributors	

Step 1B: Specify the Instructional Setting						
Instructional Setting:		Single Student	X	Small Group		Whole Class

Step 1C: Enter Lesson Description and Objective(s)	
*General Description of Lesson:	Raising awareness on the water crisis in California and how it affects the two biggest users of Urban and Agriculture. The lesson will also go through some of the ways California is battling this crisis.
*Objective(s) of Lesson:	* Raise awareness of California's water crisis. * Inform students on some of the ways that California is battling against the water crisis. * Several water conservation methods. * Some water replenish methods.

Step 2A: Select the Subject and Strand(s)/Domain(s)	
*Subject Area:	Introduction to Agriculture and Ecology

Step 2B: Select the Standard(s) Addressed by your Lesson Plan	
Standard(s):	Agriculture Standards: C2.3, C3.2, E1.1, E2.2 Biology Standards: 6.b, 6.d

Step 3A: Specify the types of assessments that will be used					
*Assessment type(s)		Writing Samples	X	Projects	
		Demonstrations		Rubrics	
		Observations		Journals	
		Portfolios		Teacher-made test	
		Surveys	X	Other:	Water Cycle Activity
		Interviews			

Step 3B: Specify how student learning will be assessed	
Describe the assessment plan:	• Students will be asses by knowing the water cycle and knowing where the majority of California's water comes from. • Different ways of conservation and replenishment that California is either implanted or discussing to implement.
Step 4: Add instructional materials to be used as resources with this lesson	
Materials and Resources used by teachers and students:	• Water cycle activity (attached). • PowerPoint lecture (attached).

Step 5: Specify how the lesson will be implemented	
*Teacher Procedure:	1) Go through the attached PowerPoint to give a brief overview of the water cycle and the water crisis in California. 2) Give the students that activity that is attached and make sure that they are doing that activity correctly. 3) Calculate how much water student use on a daily/weekly basis and determine how much rainfall is needed to compensate. 4) Plan a project that will measure how much rain has fallen (this will have to be planned on days that actually rain), if it does not rain during the lesson plan period

	then use data from cdec.water.gov/snow_rain.html			
*Student Tasks:	1) Takes specific notes on the PowerPoint during lecture. 2) Do the activity as homework and make sure to turn in the activity for feedback and corrections. 3) Record and calculate how much water you use using the chart that is given in class. 4) Measure the rainfall in your assigned area to calculate how much water has been collected.			
*Time Required:	# of class periods:	5	# of minutes per class period:	45mins
Notes, tips, suggestions, and/or extension activities:	Take about two class periods to go over the PowerPoint and lecture material so that the students can have plenty of time for questions. If possible show a video during class so that the students can have a visual representation of how the water cycle works.			

Activities

Name _____
Date _____

Water Conservation

Purpose
The purpose of this exercise is to study the water cycle and factors which have created water problems.

Procedure
Materials
1. Colored pencils

Sequence of Steps
1. Read the following information about "The Water Cycle"

   Rain, sleet and snow are forms of precipitation. The return of water vapor to the atmosphere is **evaporation**. Together, these processes constitute the **water cycle**. Following precipitation, water may run of the ground and collect in streams, ponds and oceans. This is **surface water**. Some of the water may soak into the ground and reach the water table, enter plant roots, rise through the soil to the surface, or emerge as a spring.

2. The landscape shown in "observations" is a setting for the construction of a diagram of the water cycle. Movement of water will be indicated with arrows; the arrow indicates the direction of movement. The color of the arrow will classify the water as:
   - Precipitation (red)
   - Surface water (blue)
   - Ground water (green)
   - Water evaporating and returning to the atmosphere (yellow)

   Indicate the kind of water with a letter placed on the arrow, according to the description and key below the water cycle.

Observations
1. Use the directions above and the key provided to illustrate the diagram of the water cycle on the next page.
   a. Precipitation from cloud to earth (red)
   b. Runoff water to pond (blue)
   c. Surface water stored in pond (blue)
   d. Ground water seeping through soil to water table (green)
   e. Ground water stored in water table (green)
   f. Ground water absorbed by plant roots (green)
   g. Water transpired from leaves to atmosphere (yellow)
   h. Water evaporating from soil surface into atmosphere (yellow)
   i. Water evaporating from surface of pond (yellow)

Conclusions:

Explain the problems created by each of the following practices related to water:

1. Pumping water from deep wells for air-conditioning systems in buildings.

2. Draining swamps and marshes.

3. Cutting forests in watershed (hilly) regions.

4. Cutting bottomlands and flood plains along large rivers.

5. Losing top soil through erosion.

6. Draining fields by means of tile lines and ditches.

7. Water conservation is a major issue in California. Some farmers choose to use drip irrigation instead of sprinkler or flood irrigation. Define these types of irrigation and explain how water is conserved.

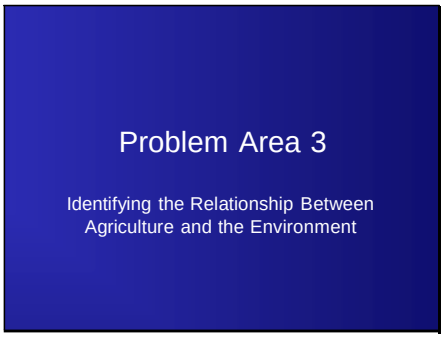
8. Farmers also may choose to cover irrigation holding ponds. How will this improve water conservation?

9. Investigate: How has new technology improved water conservation in agriculture?

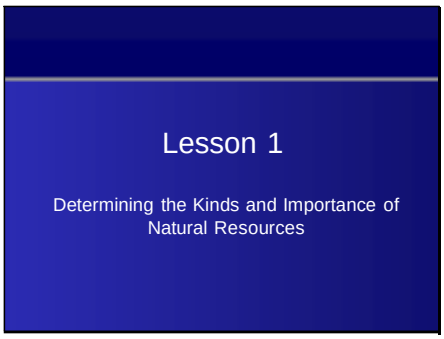
Agricultural Biology Curriculum Lesson Plans. Sacramento: California State Department of Education, Agriculture Education Unit, 1990.
"The Water Cycle." Mordialloc Cluster. 3 Oct 2008 <www.mordialloccluster.vic.edu.au>

Slide 1

Slide 2



Slide 3



Slide 4

Interest Approach

Ask students to list the natural resources used to create objects around the classroom. Determine if students can identify how the remainder of the natural resource was used. Indicate that the lesson will focus on natural resources. Move on to the objectives of the lesson.

Slide 5

Student Learning Objectives

- 1. Describe the environment.
- 2. Explain natural resources and list examples.
- 3. Contrast and compare renewable and nonrenewable natural resources.
- 4. Describe the ways natural resources are important to agriculture.

Slide 6

Terms

- Environment
- Exhaustible natural resource
- Fossil fuel
- Inexhaustible natural resource
- Natural resource
- Nonrenewable natural resource
- Renewable natural resource

Slide 7

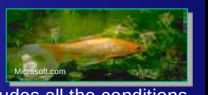
Objective 1:

- Describe the Environment

Slide 8

What is the Environment?

- The ***Environment*** is a living organism's surroundings.



– The *Environment* includes all the conditions that influence an organism.

A. The environment is constantly changing.

B. It is usually considered the physical features around us.

Slide 9

Objective Two

- Explain natural resources and list examples

Slide 10

What are Natural Resources?

- ***Natural resources*** are resources that occur naturally and are found in nature.

Slide 11

What are Natural Resources?

- *Natural resources* are used to provide for the needs of humans and all other living organisms.

Slide 12

What are Natural Resources?

- Humans cannot make natural resources.
- Humans use natural resources in many ways.
- Nearly everything humans use is derived from a natural resource.

Slide 13

What are Natural Resources?

- *Natural resources are grouped into several categories.*
  - Wildlife, plants, animals, and other organisms that have not been domesticated.
  - Air: a mixture of gases that surrounds the earth and is used by humans in numerous ways.

Slide 14

What are Natural Resources?

- *Natural resources are grouped into several categories. (continued)*
  - Soil: the outer layer of the earth™s crust that supports plant life.
  - Water: a substance that is required for all living organisms to survive.
  - Minerals: inorganic substances taken from the earth to make other useful objects.

Slide 15

What are Natural Resources?

- *Natural resources are grouped into several categories. (continued)*
  - Fossil Fuels: organic substances mined from the earth. They are used to provide energy and to manufacture other objects.

Slide 16

Objective Three

- Contrast and compare renewable and nonrenewable natural resources.

Slide 17

How are Renewable and Nonrenewable natural resources alike and different?

- Natural resources are either Renewable or Nonrenewable.

Slide 18

How are Renewable and Nonrenewable natural resources alike and different?

- ***Renewable Natural Resources*** can be replenished by the environment.
  - Soil, air, wildlife, and water are examples.
  - Replacing them may take a long time.
  - If managed improperly, the resource may be depleted before replacement occurs.

Slide 19

How are Renewable and Nonrenewable natural resources alike and different?

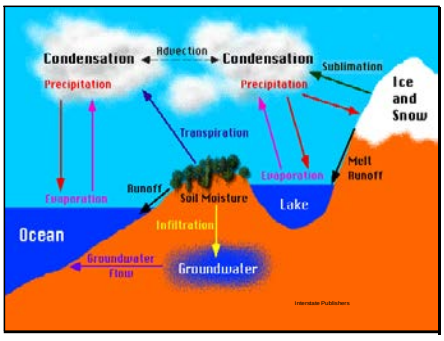
- ***Nonrenewable Natural Resources*** cannot be replenished by the environment.
  - Minerals are considered nonrenewable.
  - The limited nature of nonrenewable natural resources explains their relatively high cost.

Slide 20

How are Renewable and Nonrenewable natural resources alike and different?

- ***Inexhaustible Natural Resources*** will last forever regardless of human activity.
- Water is practically limitless, due to the Hydrologic Cycle; however, mismanagement can cause water to be unfit for use.
- These resources can be either renewable or nonrenewable.

Slide 21



Slide 22

How are Renewable and Nonrenewable natural resources alike and different?

- ***Exhaustible Natural Resources*** are in limited supply in the environment.
- Fossil fuels are considered exhaustible natural resources.
- These resources may exist in such large quantities that they are considered inexhaustible.

Slide 23

Objective Four

- **Describe the ways natural resources are important to agriculture.**

Slide 24

How are natural resources important to agriculture?

- All natural resources are dependent on the others.

A. Natural resources are interdependent.

1. Humans use animals that use plants, air, and water.
2. Hawks eat fish that eat insects that eat decomposing plants.

Slide 25

How are natural resources important to agriculture?

- All natural resources are dependent on the others. *(Continued)*

B. Agriculture is used to feed and clothe the world.

1. Soil minerals, air, and water are needed by plants to grow.
2. Livestock eat plants to produce muscle tissue and fiber.

Slide 26

Review / Summary

- What is an Environment?
- Identify the groups that Natural Resources are grouped?
- How are Renewable and Non-Renewable resources different?
- Which resource is found in the greatest quantity?
- Why are Natural Resources important to agriculture?

Chapter 5

Conclusions and Recommendations

Conclusion

Based on thorough research and analysis this lesson plan is ready to be ready to be used as a test run. The test run will determine if the material that is taught to the students will have a high retention rate. This lesson plan is designed to raise awareness of the water crisis and what is happening to the water source in California. Some of the positive outcomes that can be expected is the spark of interest with the topic of water, willingness to be more conscious about the water that is being used, and motivation to conserve water. Some of the negative outcomes that might branch from this lesson plan is a boring subject that the students do not agree with. It might also bring up a controversial topic that some of the students disagree about in the classroom.

Recommendation

It is recommended that this lesson plan used as a skeleton of a curriculum that the teacher will prepare. Although there are many great points that needs to be taught to the students this lesson plan only shows a brief overview of the water crisis. Through this lesson plan there should be a whole curriculum that could be planned for the student's benefit. It is also recommended that the teacher should utilize the activities and PowerPoint

slides that are attached.

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Appendix A

Slides for Lesson Plan

Unit A 3-1
Agricultural Literacy

Problem Area 3

Identifying the Relationship Between Agriculture and the Environment

Lesson 1

Determining the Kinds and Importance of Natural Resources

Interest Approach

Ask students to list the natural resources used to create objects around the classroom. Determine if students can identify how the remainder of the natural resource was used. Indicate that the lesson will focus on natural resources. Move on to the objectives of the lesson.

Student Learning Objectives

- 1. Describe the environment.
- 2. Explain natural resources and list examples.
- 3. Contrast and compare renewable and nonrenewable natural resources.
- 4. Describe the ways natural resources are important to agriculture.

Terms

- Environment
- Exhaustible natural resource
- Fossil fuel
- Inexhaustible natural resource
- Natural resource
- Nonrenewable natural resource
- Renewable natural resource

Objective 1:

- Describe the Environment

What is the Environment?

- The ***Environment*** is a living organism's surroundings.

  - The *Environment* includes all the conditions that influence an organism.

    A. The environment is constantly changing.

    B. It is usually considered the physical features around us.

Objective Two

- Explain natural resources and list examples

What are Natural Resources?

- ***Natural resources*** are resources that occur naturally and are found in nature.

What are Natural Resources?

- *Natural resources* are used to provide for the needs of humans and all other living organisms.

What are Natural Resources?

- Humans cannot make natural resources.
- Humans use natural resources in many ways.
- Nearly everything humans use is derived from a natural resource.

What are Natural Resources?

- *Natural resources are grouped into several categories.*
  - Wildlife, plants, animals, and other organisms that have not been domesticated.
  - Air: a mixture of gases that surrounds the earth and is used by humans in numerous ways.

What are Natural Resources?

- *Natural resources are grouped into several categories. (continued)*
  - Soil: the outer layer of the earth™s crust that supports plant life.
  - Water: a substance that is required for all living organisms to survive.
  - Minerals: inorganic substances taken from the earth to make other useful objects.

What are Natural Resources?

- *Natural resources are grouped into several categories. (continued)*
- Fossil Fuels: organic substances mined from the earth. They are used to provide energy and to manufacture other objects.

Objective Three

- Contrast and compare renewable and nonrenewable natural resources.

How are Renewable and Nonrenewable natural resources alike and different?

- Natural resources are either Renewable or Nonrenewable.

How are Renewable and Nonrenewable natural resources alike and different?

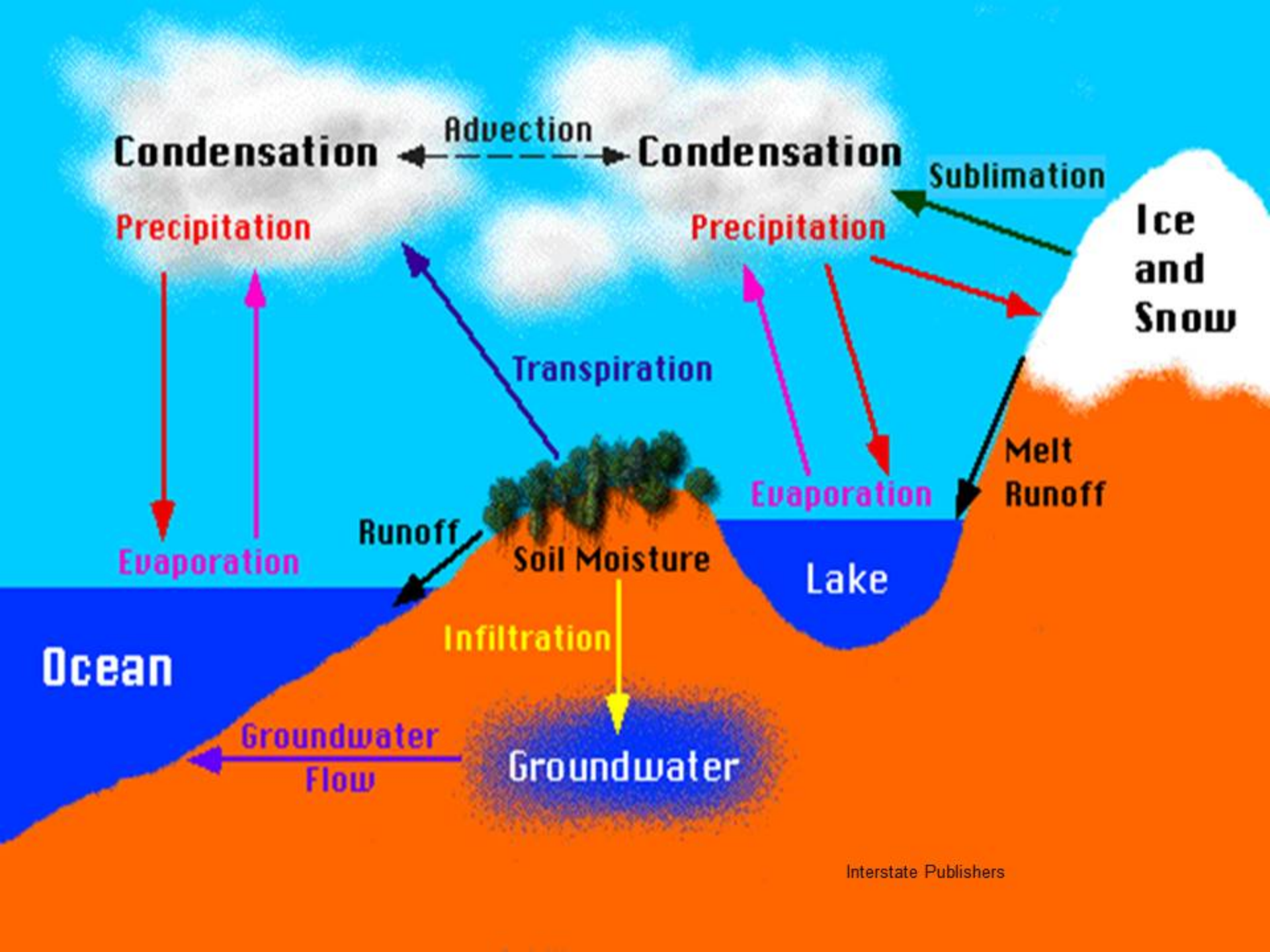
- ***Renewable Natural Resources*** can be replenished by the environment.
  - Soil, air, wildlife, and water are examples.
  - Replacing them may take a long time.
  - If managed improperly, the resource may be depleted before replacement occurs.

How are Renewable and Nonrenewable natural resources alike and different?

- ***Nonrenewable Natural Resources*** cannot be replenished by the environment.
  - Minerals are considered nonrenewable.
  - The limited nature of nonrenewable natural resources explains their relatively high cost.

How are Renewable and Nonrenewable natural resources alike and different?

- ***Inexhaustible Natural Resources*** will last forever regardless of human activity.
- Water is practically limitless, due to the Hydrologic Cycle; however, mismanagement can cause water to be unfit for use.
- These resources can be either renewable or nonrenewable.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Evaporation
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Soil Moisture
Lake
Evaporation
Ocean
Infiltration
Groundwater Flow
Groundwater
Interstate Publishers

How are Renewable and Nonrenewable natural resources alike and different?

- ***Exhaustible Natural Resources*** are in limited supply in the environment.
- Fossil fuels are considered exhaustible natural resources.
- These resources may exist in such large quantities that they are considered inexhaustible.

Objective Four

- **Describe the ways natural resources are important to agriculture.**

How are natural resources important to agriculture?

- All natural resources are dependent on the others.

A. Natural resources are interdependent.

1. Humans use animals that use plants, air, and water.
2. Hawks eat fish that eat insects that eat decomposing plants.

How are natural resources important to agriculture?

- All natural resources are dependent on the others. *(Continued)*

B. Agriculture is used to feed and clothe the world.

1. Soil minerals, air, and water are needed by plants to grow.
2. Livestock eat plants to produce muscle tissue and fiber.

Review / Summary

- What is an Environment?
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